Unit 20: Understanding Principles and Methods of Design for Blacksmithing and Metalworking

Unit reference number: Y/602/0719

QCF Level 3: BTEC National

Credit value: 10

Guided learning hours: 60

Aim and purpose

This unit aims to introduce learners to the principles and methods of design for blacksmithing and metalworking, and how these can be applied in practice. It is designed for learners in centre-based settings looking to progress into the sector or on to further/higher education.

Unit introduction

Developing an understanding of the key principles which govern design practice, and applying these to realistic situations, extends the range of possible solutions to manufacturing problems. Designers of fabricated products are directed and influenced in determining product appearance and function by the design brief, which in turn is influenced by the environment as well as by social and cultural influences.

Learning outcomes 1 and 2 introduce and encourage learners to develop their own distinctive approach to design practice and to work effectively within a group. Learners will develop an understanding of the importance of using appropriate design methods to achieve their creative intentions. The application of a design methodology will ensure that all significant factors are considered within a structure of development and that briefs are undertaken thoroughly.

Learning outcome 3 looks at social and cultural impacts on the design process.

Learning outcome 4 covers design for need and the designer's responsibilities to the wider community. The design process requires skills of analysis as well as synthesis, time management, teamwork and organisation. Learners will be introduced to the skills needed to work through the design development cycle to produce successful design outcomes.

Learning outcomes

On completion of this unit a learner should:

1 Understand design processes

2 Understand the design development cycle and its phases

3 Understand cultural association

4 Understand design for need and the designer's responsibilities to the wider community.

Unit content

1 Understand design processes

Principle of how 'form relates to function' (or purpose): client brief and relationship to finished design; methods used to create finished work to meet defined functional requirements

Considerations in meeting metalwork design requirements: fashionable periods eg avant garde, post-modern or historical; the functional requirements of the design; structural qualities eg strength, weight, stability, durability; visual qualities eg colour, surface, reflective, opacity, transparency or pattern; surface qualities eg texture, smooth, reflective, matt, soft, soothing or exciting; making use of the qualities and characteristics of selected materials to develop effective creative relationships and to explore the dynamics between different materials and processes in meeting their creative intentions and the requirements of the brief; the symbolic significance of the type of product being designed eg historical or contemporary (cultural, social or religious)

2 Understand the design development cycle and its phases

The design development cycle: analysis and clarification of the brief eg by careful reading, consultation and discussion, analysis of design requirements, initial ideas, confirmation of brief; planning eg a sequence of development, timing and time management, resource allocation and organisation, costing and consultation; research eg identification of relevant information from primary and secondary sources, collection, investigation and selection, use of databases, market intelligence (about competitors, market and consumer needs); ideas development eg origination and exploration of initial ideas, development of a range of alternative solutions, exploration or investigation of suitable materials, techniques and technology; review and modification eg alteration of work in hand, to the design development cycle; development of potential outcomes eg proofs, mock-ups, samples, 2D visualisation, models, maquettes and/or prototypes for testing; consultation eg with clients, users, colleagues and other interest groups; final outcome eg artefacts, designs for production, presentation of designs in response to brief; evaluation of whole cycle eg research methods, making processes and final outcome against the brief

3 Understand cultural association

Cultural association: definition and importance of cultural association; aesthetic values and issues of 'taste' of different user groups in creating design solutions; user groups eg individuals, cultural/social groups, commercial organisations or target market groups; western and non-western, historical and contemporary eg trends, fashion, individual or group identity; cultural significance of signs, symbols and stylistic conventions, commercial identity, propaganda, ethical and environmental issues

4 Understand design for need and the designer's responsibilities to the wider community

Design for need and responsibilities to the wider community: the key needs of a client brief or design problem eg 'who and/or where is it for?', 'what is its purpose?', 'how can the needs best be met within the identified constraints?'; designer's responsibilities to eg client, the public, specified users, members of the manufacturing team and the environment; designer's responsibilities relating to other issues eg contracts, value for money, practicality of construction, quality control, health and safety; development of personal approaches to design; methods of working effectively in teams; relevant, current legislation eg health and safety at work legislation, copyright, designs and patents legislation

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria			
To achieve a pass grade the evidence must show that the learner is able to:		**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P1	explain the principle of how form relates to function in relation to a selected design [IE, CT, RL, SM]		
P2	undertake a client brief, explaining the importance and influence of this on the requirements of the finished design [IE, CT, RL, SM]		

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P3 explain the phases of the design development cycle in relation to a selected project [IE, CT, RL, SM]	**M1** develop a design development cycle for a selected artefact to meet a given client brief	**D1** evaluate the actual design development cycle and the final design of a finished artefact against the client brief and make recommendations for improvement.
P4 explain the importance of cultural association in the design of artefacts [IE, CT, RL, SM]	**M2** develop a finished design to meet a selected client brief with justification for its cultural association.	
P5 discuss the designer's responsibilities to the client [IE, CT, RL, SM]		
P6 explain the relationship between the client brief and the requirements of the finished design [IE, CT, RL, SM, EP] **P7** explain the principle of design for need [IE, CT, RL, SM] **P8** explain the designer's responsibilities to the wider community. [IE, CT, RL, SM]		

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

Key	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

Delivery of this unit will involve practical assessments, written assessment, visits to suitable collections and will link to work experience placements.

Tutors delivering this unit have opportunities to use as wide a range of techniques as possible. Lectures, discussions, seminar presentations, site visits, supervised design and workshop practicals, research using the internet and/or library resources and the use of personal and/or industrial experience would all be suitable. Delivery should stimulate, motivate, educate and enthuse learners.

Work placements should be monitored regularly in order to ensure the quality of the learning experience. It would be beneficial if learners and supervisors were made aware of the requirements of this unit before any work-related activities so that naturally occurring evidence can be collected at the time. For example, learners may have the opportunity to use design processes, and they should be encouraged to ask for observation records and/or witness statements to be provided as evidence of this. Guidance on the use of observation records and witness statements is provided on the Pearson website.

Whichever delivery methods are used, it is essential that tutors stress the importance of work planning, sound environmental management and the need to manage the resource using legal methods.

Health and safety issues relating to working in the forge and machine workshop must be stressed and reinforced regularly, and risk assessments must be undertaken before any practical activities. Adequate personal protective equipment (PPE) must be provided and used following the production of suitable risk assessments.

Tutors should consider integrating the delivery, private study and assessment for this unit with other relevant units and assessment instruments learners are taking as part of their programme of study.

It is recommended that this unit is linked with other practical units within the blacksmith and metalwork programme, rather than being delivered as a stand-alone unit. This will allow learners to gain an understanding of design methods through experience, rather than just theory. This unit can be taught effectively using an integrated project with other compatible units. In particular, learners should gain enough exposure to professional practice to recognise the significance of using a methodical approach to solve design problems, particularly within a team. It is equally important to demonstrate that creative work requires a wide range of methods and processes in order to meet specified design requirements.

Learning outcomes 1 and 2 are directly linked. These are likely to be delivered through formal lectures, discussion and independent learner research of one or more case studies. Learners will be aware of the methods and associated activities commonly used within the design process and the implementation of the design development cycle. Visiting expert speakers could add to the relevance of the subject for learners. For example, local designers within blacksmithing and metalwork, or other design fields, could talk about their work, the situations they face and the methods they use.

Learning outcome 3 covers social and cultural impacts on the design process. Delivery techniques should be varied and can be linked to the delivery of learning outcomes 1 and 2. It is expected that formal lectures, discussions and site visits could form a major part of the delivery of this learning outcome.

Learning outcome 4 looks at the methods commonly used to establish a link between the expectation of a design brief and the final piece. This could include the establishment of the brief and investigation of the external influences affecting the designed work. Delivery techniques should be varied. It is expected that formal lectures, demonstrations, workshops and supervised site visits could form a major part of the delivery of this learning outcome. Visiting clients and actual design commissions (real or simulated) could add to the relevance and validity of the set work.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan gives **an indication of the volume of learning it would take learners** to achieve the learning outcomes. It is **indicative and is one way of achieving the credit value**.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Topic and suggested assignments/activities and/assessment
Introduction and overview of the unit.
Assignment 1: The Design Cycle – Evolution, Development and Evaluation (P1, P2, P3, P7, M1, D1) Tutor introduces the assignment.
Discuss relationship between the development of a design cycle, form and function, and satisfying need.
Undertake development of an example design cycle.
Undertake review of design cycle.
Assignment 2: Cultural Brief (P4, M2) Tutor introduces the assignment.
Undertake a design brief with cultural associations.
Undertake review of cultural brief.
Assignment 3: The Designer's Responsibilities (P5, P6, P8) Tutor introduces the assignment brief.
Discuss the blacksmith's responsibilities in relation to a particular brief.
Unit review.

Assessment

For P1, learners must explain the relationship between form and function in relation to a selected design. Learners could include as part of their evidence examples of finished designs that they have seen or been involved in during the delivery of this unit. This could take the form of a pictorial presentation with notes (possibly using appropriate software or an overhead projector) or a written assignment.

For P2, learners must explain the relationship between the client brief and the requirements of the finished design. Learners could include examples of client briefs that they have seen or been involved with during the delivery of this unit as part of their evidence. This could take the form of a pictorial presentation with notes (possibly using appropriate software or an overhead projector) or a written assignment.

For P3, learners are required to explain the phases of the design development cycle in relation to a selected project. Tutors should identify the project or agree it through discussion with learners. The project may be the same as that used to provide evidence for other grading criteria. Where possible, to ensure assessment is fair, the size and complexity of the task should be the same for all learners.

P3 could be assessed directly by the tutor during practical activities. If this format is used then suitable evidence from guided activities would be observation records completed by learners and the tutor and accompanied by appropriate work logs or other relevant learner notes. If assessed during a placement, witness statements should be provided by a suitable representative and verified by the tutor.

Alternatively, evidence for P3 could take the form of a pictorial presentation with notes (possibly using appropriate software or an overhead projector) or a written assignment.

For P4, learners are required to explain the relationship between the client brief and the requirements of the finished design. This could include the initial client consultation, establishment of the brief, and site, social and cultural requirements. Learners could include in their evidence examples of client briefs and finished designs that they have seen or been involved with during the delivery of this unit. Evidence could be in the same form as for P1.

P4 requires learners to explain the importance of cultural association in the design of artefacts. Learners could include as part of their evidence examples of artefacts that they have seen or been involved with during the delivery of this unit. These could take the same form as for P1. Tutors should identify the selected artefact and client brief or agree them through discussion with learners. The selected artefact and client brief may be the same as those used to provide evidence for other grading criteria. Where possible, to ensure assessment is fair, the size and complexity of the task should be the same for all learners. Recommendations for improvement must be appropriate and viable. Evidence could be in the same form as for P1.

For P5, learners must discuss the designer's responsibilities to the client. Learners could use a case study approach. Evidence could be in the same form as for P1.

For P6, learners must explain the relationship between the client brief and the requirements of the finished design. Tutors should identify the finished design and client brief or agree them through discussion with learners. The finished design and client brief may be the same as those used to provide evidence for other grading criteria. Where possible, to ensure assessment is fair, the size and complexity of the task should be the same for all learners. Recommendations for improvement must be appropriate and viable. Evidence could be in the same form as for P1.

For P7, learners are required to explain the principle of 'design for need'. Tutors should identify at least three different artefacts or agree them through discussion with learners. The artefacts may be the same as those used to provide evidence for other grading criteria. Where possible, to ensure assessment is fair, the size and complexity of the task should be the same for all learners. Evidence could be in the same form as for P2.

For P8, learners must discuss the designer's responsibilities to the wider community. Learners could use a case study approach. Evidence could be in the same form as for P1.

For M1, learners are required to develop a design development cycle for a selected artefact to meet a given client brief. Tutors should identify the artefact and client brief or agree them through discussion with learners. The artefact and client brief may be the same as those used to provide evidence for other grading criteria. Where possible, to ensure assessment is fair, the size and complexity of the task should be the same for all learners. Evidence could be in the same form as for P2.

For M2, learners must develop a finished design to meet a selected client brief. Tutors should identify the client brief or agree it through discussion with learners. The client brief may be the same as that used to provide evidence for other grading criteria. Where possible, to ensure assessment is fair, the size and complexity of the task should be the same for all learners. Evidence could be in the same form as for P2.

For D1, learners are required to evaluate the actual design development cycle of a selected artefact and its success in the final design against the client brief, and make recommendations for improvement. Tutors should identify the selected artefact, development cycle and client brief or agree them through discussion with learners. The selected artefact, development cycle and client brief may be the same as those used to provide evidence for other grading criteria. Where possible, to ensure assessment is fair, the size and complexity of the task should be the same for all learners. Recommendations for improvement must be appropriate and viable. Where appropriate, improvements to making quality should be demonstrated within the design outcomes/artefacts produced. The outcomes/artefact and specification may be the same as those used to provide evidence for other grading criteria.

Programme of suggested assignments

The following table shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, P7, M1, D1	The Design Cycle – Evolution, Development and Evaluation	The design process involves a number of well-established elements which lead to a design with integrity and appropriateness to the brief. You are to discuss the principles of the process in relation to the cycle, form and function, and satisfying need. This will culminate with a developed example design cycle, with an evaluation.	Written work. Observation and assessment of practical work.
P4, M2	Cultural Brief	You have undertaken a design brief with cultural associations. You are to develop a design which takes account of these, with justification.	Written work. Observation and assessment of practical work.
P5, P6, P8	The Designer's Responsibilities	In relation to a specified brief, you are to explain the relationship between the client brief and the wider community, the client and the requirements of the finished design.	Written work.

Links to other BTEC units

This unit forms part of the BTEC land-based sector suite. This unit has particular links with:

Level 2	Level 3
	Undertake Drawing Practice for Blacksmithing and Metalworking
	Computer-aided Design for Blacksmithing and Metalworking
	Investigative Project in the Blacksmithing and Metalworking Sectors
	Undertake Small-scale Design for Blacksmithing and Metalworking
	Undertake Small-scale Working for Blacksmithing and Metalworking
	Undertake Large-scale Design for Blacksmithing and Metalworking
	Undertake Large-scale Working for Blacksmithing and Metalworking

Essential resources

Learners will need access to a drawing office/studio space suitable for the observational and technical drawing activities. The principal features and items of equipment should include technical drawing equipment and art materials, for example drawing boards, compasses, set squares, measuring equipment and consumables. Library and IT facilities should also be available, with access to unit- specific examples of drawing practice and internet facilities to enable research into techniques, materials, equipment and work examples.

Tutors delivering this unit should have vocationally specific craft knowledge.

Employer engagement and vocational contexts

This unit focuses on developing knowledge and appreciation of the design process in relation to the blacksmithing industry. Tutors are encouraged to make links with local blacksmiths, designers and galleries. Visiting lecturers are also advised so that learners can appreciate the conversion process within a business context.

Delivery of personal, learning and thinking skills (PLTS)

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit:

Skill	When learners are ...
Independent enquirers	discussing, creating and evaluating a design cycle
Creative thinkers	creating a design cycle
Reflective learners	evaluating a design cycle
Self-managers	discussing, creating and evaluating a design cycle.

Although PLTS opportunities are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are ...
Team workers	evaluating others' finished artefacts and design cycles
Effective participators	evaluating others' finished artefacts and design cycles.

Functional Skills – Level 2

Skill	When learners are …
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	researching cultural associations
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	researching cultural associations
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: • text and tables • images • numbers • records	producing an example design cycle with evaluation
Bring together information to suit content and purpose	producing an example design cycle with evaluation
Present information in ways that are fit for purpose and audience	producing an example design cycle with evaluation
Evaluate the selection and use of ICT tools and facilities used to present information	producing an example design cycle with evaluation
English	
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	researching cultural associations
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	producing an example design cycle with evaluation